



final report

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Technology
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Sensory Analysis of the Meatball Project for the Japanese Market

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BACKGROUND

Colonial Farm PTY Ltd. are currently producing a Meat Ball product with a Spicy Italian sauce. This product is packaged in a Modified Atmosphere Pack which has an elevated level of carbon dioxide which prolongs the storage life of the product. P.D.P. Australia on behalf of Colonial Farm wished to determine the potential of this product in the Japanese market and whether there is potential for another flavour of sauce to be added to the range. The Colonial Farm product will be compared to two competitive products.

There were three parts to this research which used Japanese consumers in Australia. Firstly consumers looked at the packaging of the Colonial Farms product and the two competitor products and recorded their expectations.

Secondly, consumers were presented with all three products for sensory evaluation.

Thirdly, consumers were asked to choose whether they would purchase the meat balls instead of two familiar Japanese dishes. This technique used Thurstone scaling to estimate which product consumers would buy when faced with the choice on a supermarket shelf. Finally, consumers were asked to evaluate some possible flavours of sauce for these products.

RESEARCH OBJECTIVES

The objectives of this project are outlined below.

1. What are consumers expectations of each product after viewing the packaging?
2. What is the relative liking of the products by Japanese consumers when tasted?
3. Are expectations of the products met after the products have been tasted?
4. What are the determinants of liking and what is their relative importance?
5. How do the sensory profiles of the three products compare?
6. How likely are Japanese consumers to buy the Colonial Farm product compared to two familiar Japanese dishes?
7. Is there potential for other sauce flavours to be added for the Japanese market?
8. How can the product be improved if necessary?

**RESEARCH DESIGN
& METHODOLOGY**

RESEARCH DESIGN

To meet these objectives SMART carried out a monadic sequential taste test. In other words, all consumers were asked to taste all products in sequence with a break between each product. They also recorded their expectations based on the packaging and evaluated some possible new flavours of sauce.

SMART used Thurstone scaling to estimate which of three products (Colonial Farm and 2 familiar Japanese dishes) products consumers are most likely to purchase. We selected two competitor dishes (Vegetable curry and Hashed beef) that are familiar to the Japanese.

This design ensures that any differences in consumer responses are because the products themselves are different and not because a different group of consumers tasted the products.

RESEARCH METHOD

Our philosophy on consumer samples, questionnaire development and data analysis is given in the appendix.

Consumer sample

30 Consumers were prescreened to meet the following criteria:

- Japanese consumers who have lived in Australia for less than two years.
- Females aged 20 to 45 years who like to eat meat

A screening questionnaire is provided in the appendix.

Questionnaire

The questionnaire was developed from Vocabulary Elicitation to ensure that consumer terminology is used.

The questionnaire was then translated into Japanese for the testing.

Both the English and the translated Japanese versions of the questionnaire are provided in the appendix.

Samples

The Colonial Farm samples were supplied by P.D.P. Australia and the competitor products were selected and purchased by SMART in the following quantities:

<u>Product</u>	<u>Code</u>	<u>Quantity</u>
P.D.P. Meatball & sauce	092	80
Curry competitor dish	536	80
Hashed Beef competitor dish	793	80

These quantities included 10 samples for vocabulary elicitation.

Presentation

Firstly consumers will look at the packaging of each product and record their expectations. Consumers then evaluated the three products for tasting. Consumers were asked to choose which product from a series of pairs they would buy. Finally they gave their opinion about some flavour options.

The order of presentation of line scales was adjusted for positional bias. Bread and water were used as palate cleansers between tastings. Consumers were required to eat at least 1/2 of each sample.

Location

Testing was conducted in Sydney City.

This report discusses only those findings deemed to be of strategic significance to Marketing Management. If more information is required reference can be made to the appended questionnaire and computer output. Please note that when the word 'significant' is used, this means 95% confidence.

EXECUTIVE SUMMARY

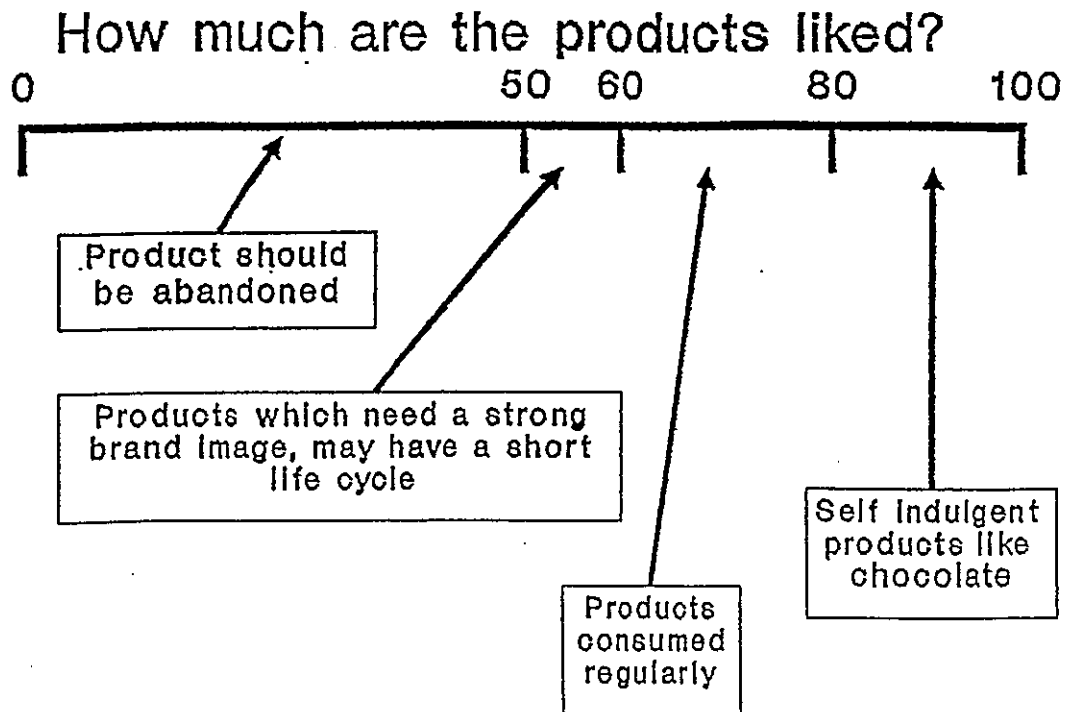
EXECUTIVE SUMMARY

1. Based on packaging alone Japanese consumers expect to like the Hashed Beef product the most, followed by the Colonial Farm Meat Balls with Spicy Italian Sauce, and the Vegetable Curry product is expected to be liked the least of the three products.

2. The relative liking of the products and our interpretation of these scores is shown on the figure on the following page. Research in Australia and overseas indicates that an overall liking score of 60 is the minimum required for long term commercial viability. Both the Hashed Beef and Vegetable Curry products are commercially viable while the Colonial Farm Meat Balls with Spicy Italian Sauce is not commercially viable.

3. Japanese consumers' expectations are very well matched by the Hashed Beef product. Japanese consumers' expectations are not well matched by either the Colonial Farm Meat Balls with Spicy Italian Sauce or the Vegetable Curry product.

4. The major determinants of liking are liking of taste, liking of meat texture, and liking of meat taste, lack of intense color, freshness and rough meat texture.



<u>Product</u>	<u>Overall Liking</u>
PDP Meatball & Sauce	50
Curry Competitor dish	62
Hashed Beef Competitor dish	66

5. Interpretation of the sensory profiles of the products suggests that the Colonial Farm Meatballs have too high fat content and may be too highly emulsified. This results in the meatballs being perceived as not fresh. The sensory profile also suggests that a sausage like profile is unacceptable to Japanese consumers, because the two preferred products are prepared from dehydrated meat pieces.

6. Japanese consumers are most likely to purchase the Hashed Beef product first followed by the Vegetable Curry product. The Colonial Farm Meat Balls with Spicy Italian Sauce product is third in purchase intent.

7. A Tomato or BBQ sauce show good potential for further developing the sauce range for the Colonial Farm Meat Balls with Spicy Italian Sauce product.

Recommendations

1. The meat balls need to be changed markedly before they will be acceptable to Japanese consumers.
2. The meat balls need a meat taste and texture which is perceived to be fresh. This means the meat balls must not have a 'sausage like' highly emulsified form.
3. The Colonial Farm Meat Balls with Spicy Italian Sauce packaging does not appeal to the Japanese at a commercially viable level. We recommend reducing the pack size and investigate new package designs.
4. A systematic optimisation of the ingredients and degree of emulsification in the meat balls would best serve to pin-point the level of fat in the meat balls which the Japanese regard as commercially viable.
5. BBQ and a Tomato flavour could provide a path for new sauce flavours for the Colonial Farm Meat Balls product for export to Japan. We must stress that improving the meat balls needs to be undertaken first as the meat balls are the primary obstacle to Japanese consumer acceptability and altering the sauce alone will not improve the product sufficiently to make it commercial viable in Japan.

DETAILED FINDINGS

DETAILED FINDINGS

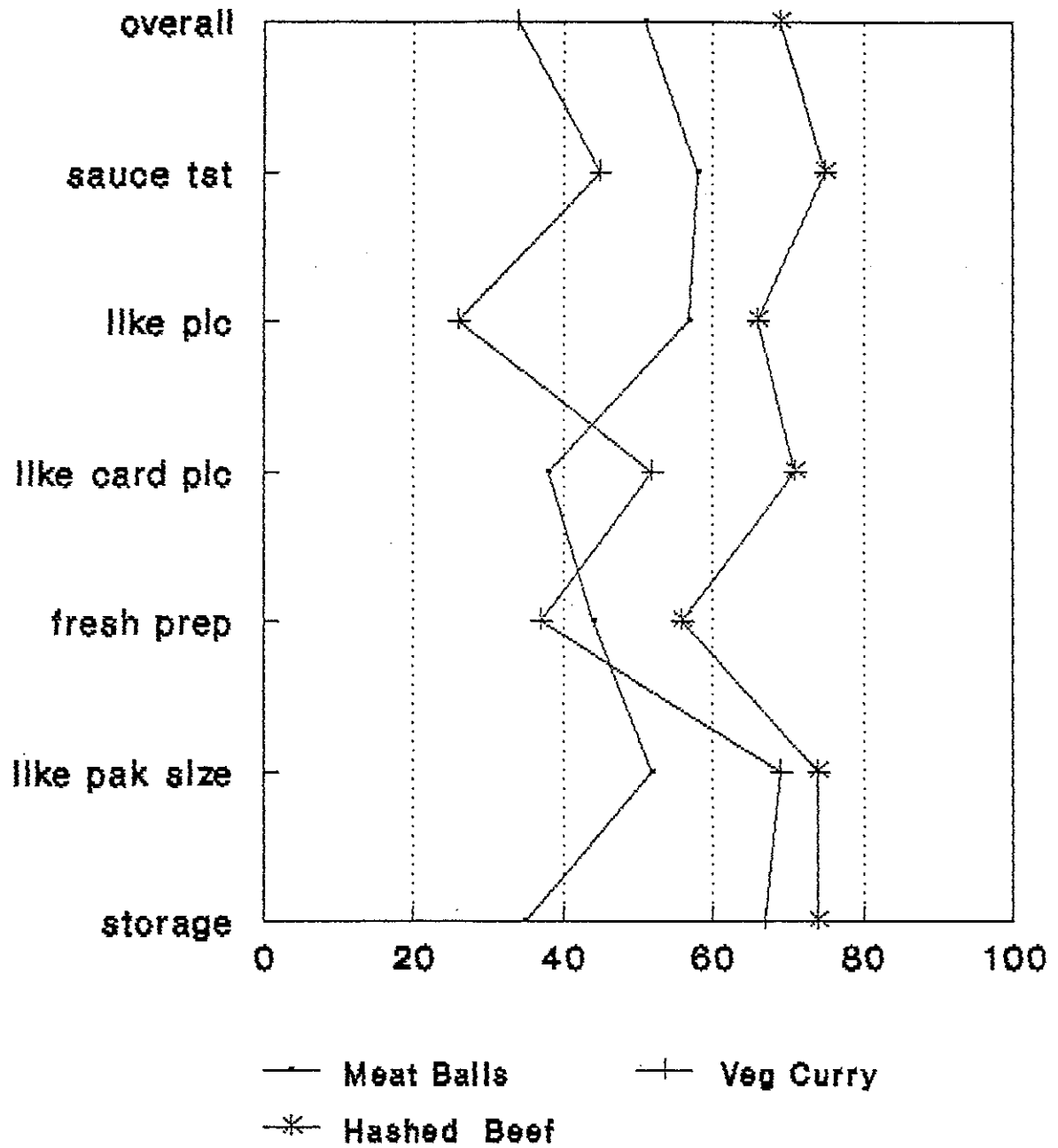
1. What are consumers expectations of each product after viewing the packaging?

Japanese consumers were presented with the Hashed Beef, Vegetable Curry and Colonial Farm Meat Balls with Spicy Italian Sauce and asked to rate various sensory attributes of the products from the packaging alone. This means the consumers gave an indication of their opinion of the product based purely on the packaging. The results of these expectations of the three products are shown in the figure on the following page.

Japanese consumers expect to like the Hashed Beef product the most, followed by the Colonial Farm Meat Balls with Spicy Italian Sauce and the Vegetable Curry product is expected to be liked the least of the three products. All these liking differences are significant.

The Japanese consumers like the picture on the Colonial Farm Meat Balls with Spicy Italian Sauce package as much as the Hashed Beef Product. Both the existing Japanese food products (Hashed Beef and Vegetable Curry) have a better liked pack size. As the Hashed Beef and Vegetable Curry products have a smaller pack size than the Colonial Farm Meat Balls with Spicy Italian Sauce product, Colonial Farm may wish to investigate reducing the pack size and this will also make storage easier.

EXPECTATIONS

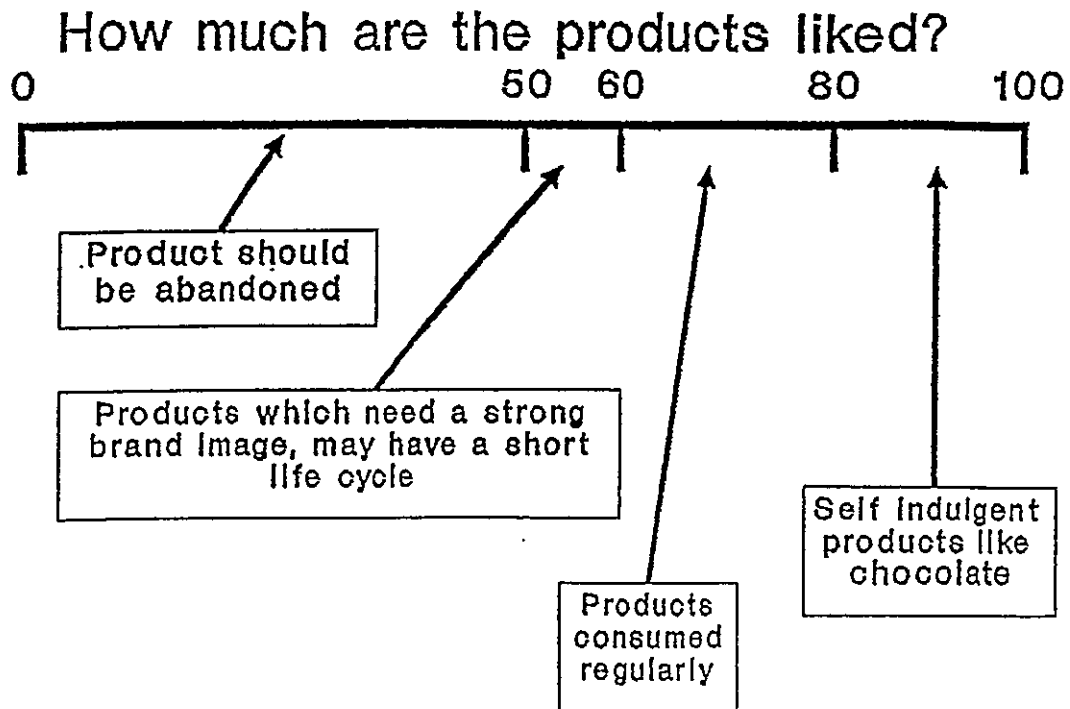


2. What is the relative liking of the products by Japanese consumers when tasted?

The relative liking of the products and our interpretation of these scores is shown on the figure on the following page. Research in Australia and overseas indicates that an overall liking score of 60 is the minimum required for long term commercial viability.

The table indicates that both the Hashed Beef and Vegetable Curry products are commercially viable while the Colonial Farm Meat Balls with Spicy Italian Sauce is not commercially viable.

The Hashed Beef product is liked significantly more than both the Vegetable Curry and Colonial Farm Meat Balls with Spicy Italian Sauce products. There is no significant difference in terms of overall liking between the Colonial Farms Meatball & Sauce product and the Vegetable Curry product.



<u>Product</u>	<u>Overall Liking</u>
PDP Meatball & Sauce	50
Curry Competitor dish	62
Hashed Beef Competitor dish	66

3. Are expectations of the products met after the products have been tasted?

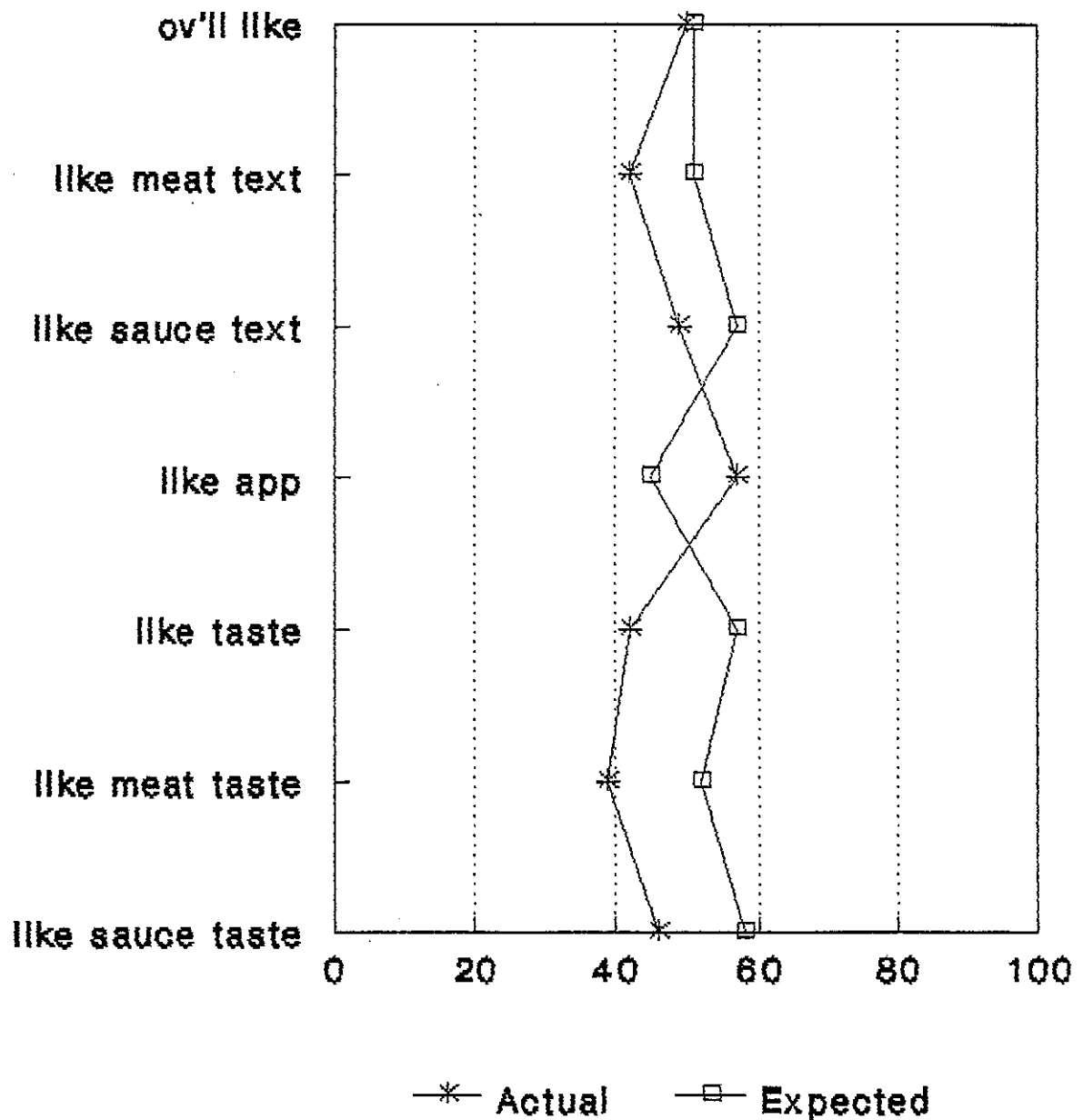
The consumers rated their expectations of each product before tasting (ie expectations of the product based on the packaging of the product alone) as well as rating the products after tasting. The figures on the following pages indicate how well Japanese consumers expectations of the product based on the packaging (expected) matched their perceptions when tasting the product (actual).

The figure on the next page shows how well Japanese consumers expectations are met when the Colonial Farm Meat Balls and Sauce product is tasted.

The first point is that Japanese consumers do not expect to like the product and after tasing the product, still do not like it. Japanese consumers expect to like the the taste and texture of the meat and the sauce and expect to like the overall taste of the product more than they do after tasting.

The Japanese consumers like the look of the product more when served than they expected to.

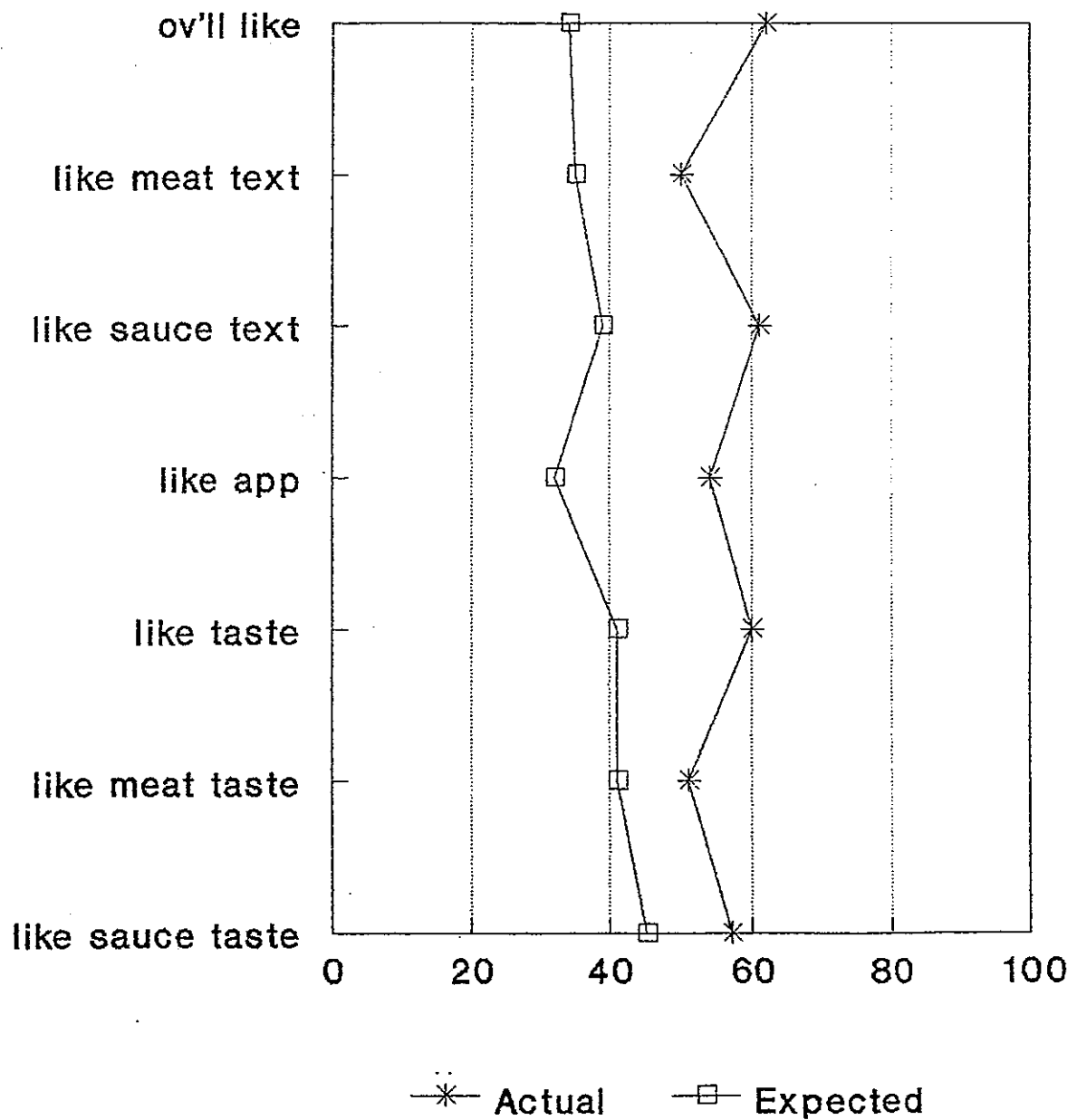
ACTUAL VS EXPECTED Meat Balls & Sauce product



The figure on the following page shows how well Japanese consumers expectations are met when the Vegetable Curry product is tasted.

The sensory profile of the tasted product far outperforms the Japanese expectations of the product. The Japanese consumers score the actual Vegetable Curry product when tasted higher on all attributes than their expectations show from the packaging. Clearly the taste drives the commercial viability for this product and improvements in the packaging could increase sales.

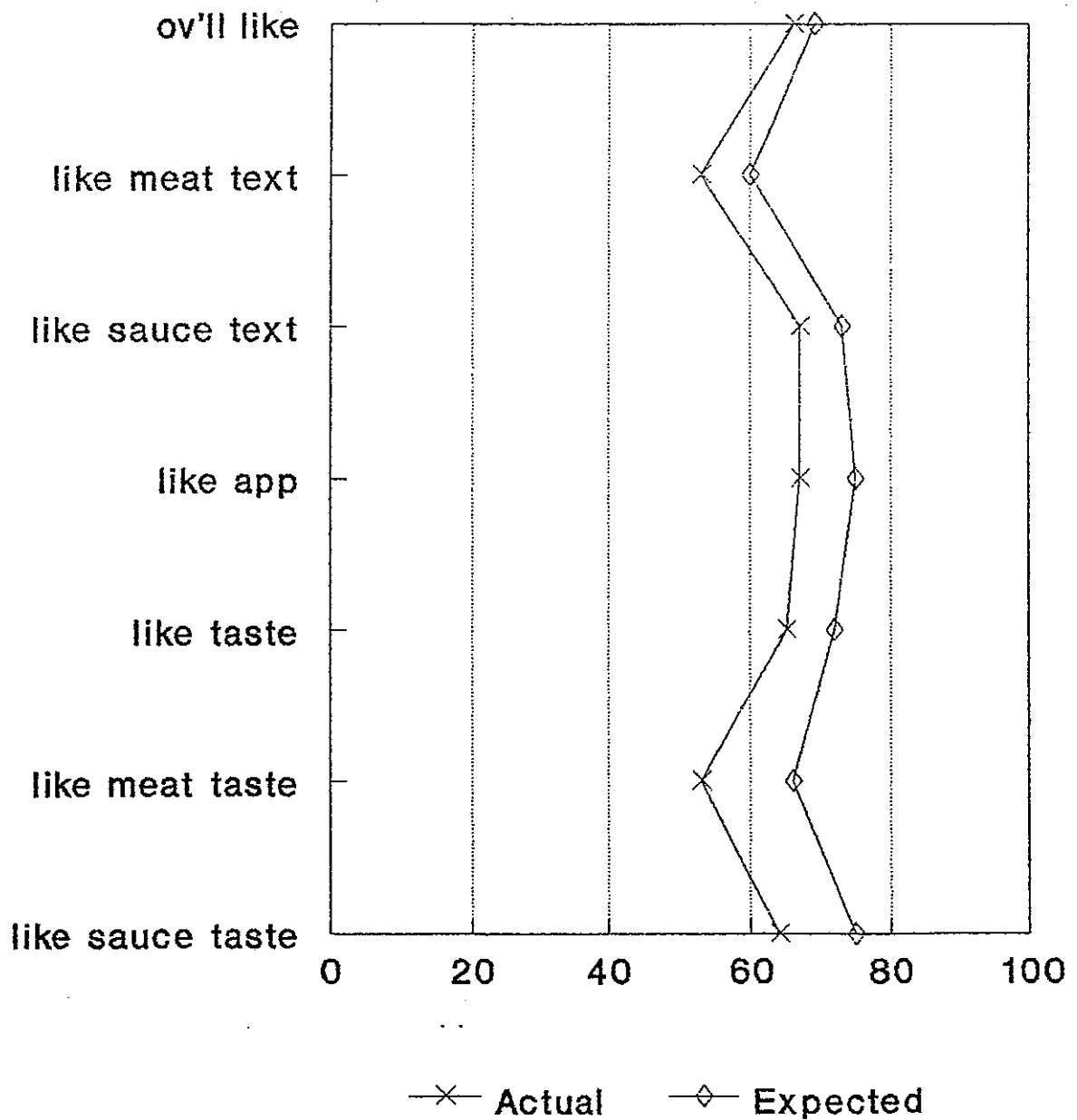
ACTUAL VS EXPECTED Vegetable Curry Product



The figure on the next page shows how well Japanese consumers expectations are met when the Hashed Beef product is tasted.

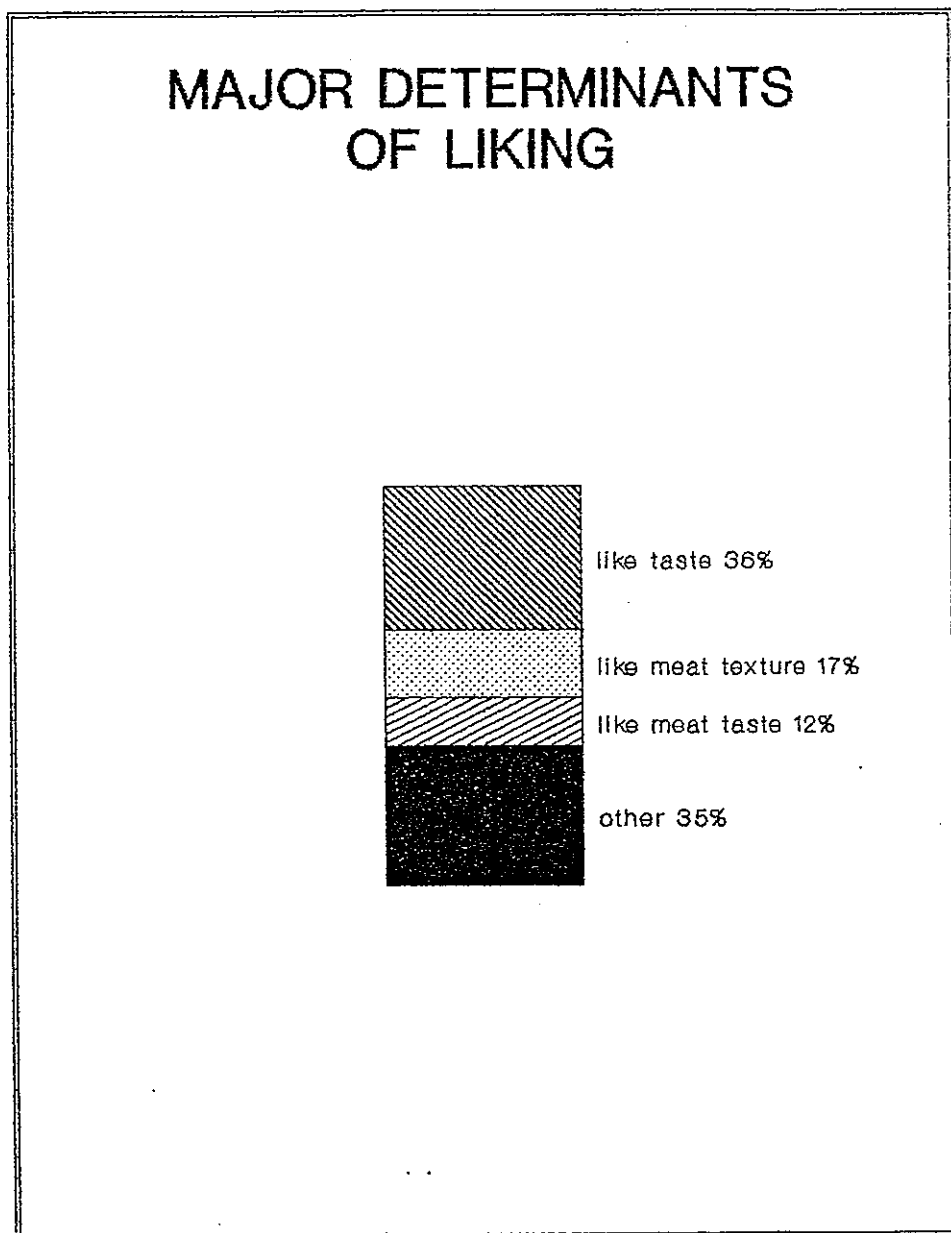
The packaging of the Hashed Beef product is very well matched by the product when tasted. Generally the expectations of the Hashed Beef product are slightly higher than when the product is tasted, but both expectations and actual tasting follow the same trend and are very close.

ACTUAL VS EXPECTED Hashed Beef Product

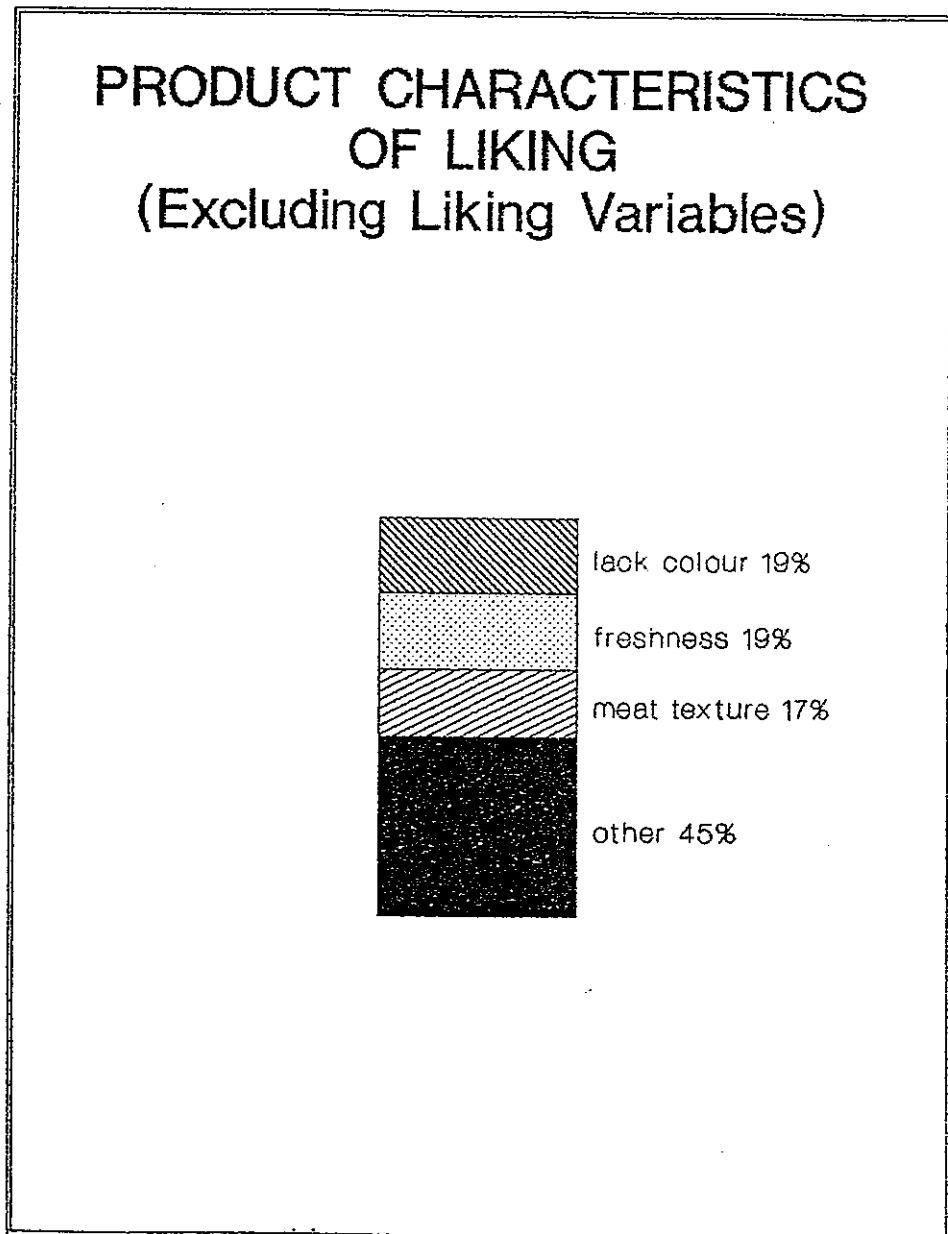


4. What are the determinants of liking and what is their relative importance?

The major determinants of liking are liking of taste, liking of meat texture, and liking of meat taste. This is shown on the stack bar chart below.



The product characteristics which determine liking are lack of intense color, freshness and texture of meat. This is shown on the stack bar chart below.



5. How do the sensory profiles of the three products compare?

The figures on the following pages show the sensory profiles of the three products.

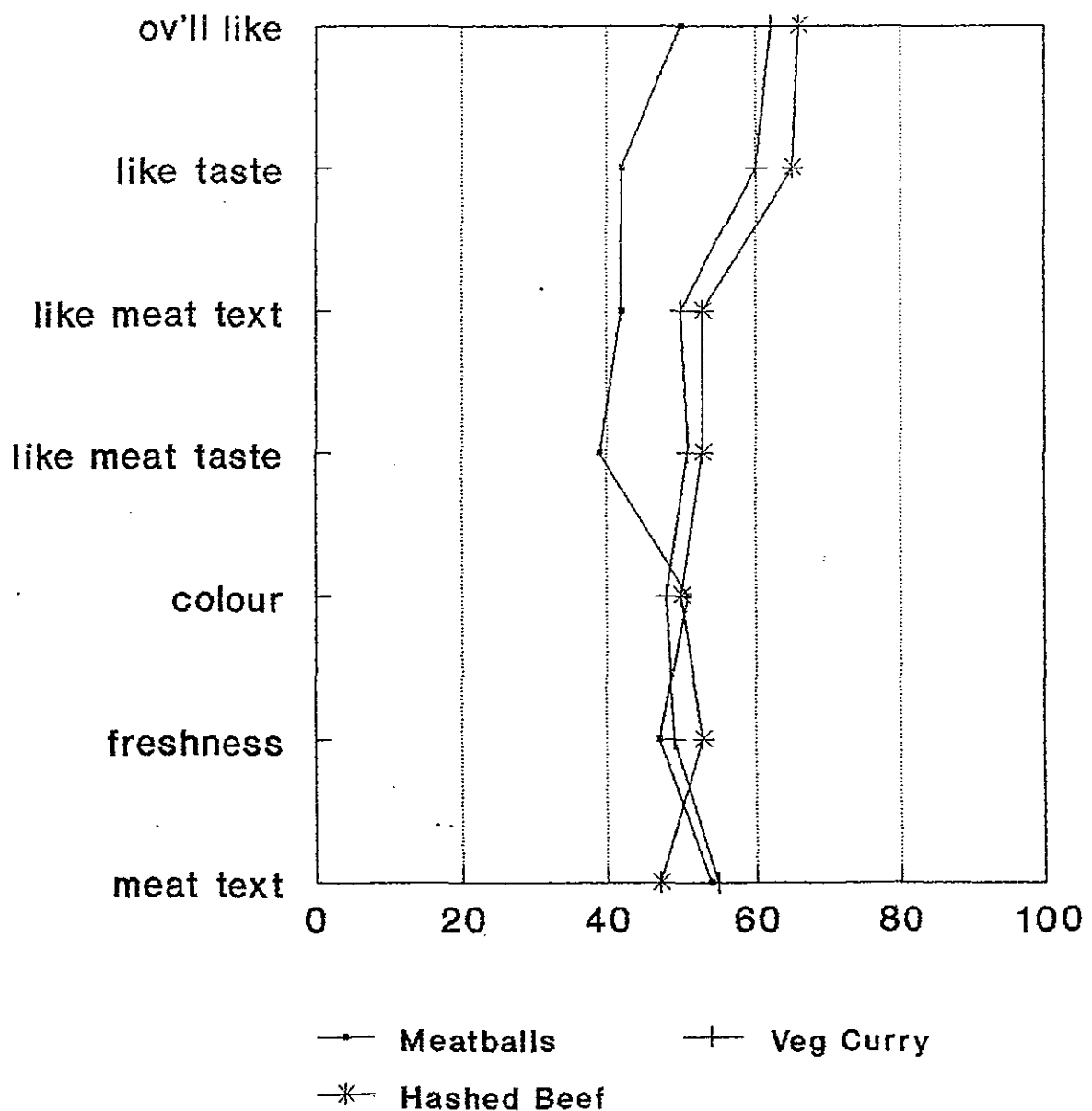
The figure on the next page shows how each product scored on the key sensory attributes that drive liking. A product which is well liked by the Japanese consumer should be in the best position on most of these key attributes.

The Hashed Beef product is liked significantly more than the Colonial Farm Meat Balls with Spicy Italian Sauce product primarily due to reasons of taste. The Hashed Beef product is liked significantly more for taste and meat taste ($P > 93\%$) than the Colonial Farm Meat Balls and Sauce product. It is notable that the Hashed Beef product is dehydrated meat pieces and therefore resembles meat in texture.

The Vegetable Curry product has a very similar sensory profile to the Hashed Beef product but generally the Hashed Beef product is in the best position on most of these key attributes. Both these products are prepared from dehydrated meat. It appears that a sausage like profile in the Colonial Farm product is unacceptable.

The Colonial Farm product is in the worst position for freshness of the three products. This together with previous observations made on meat taste and meat texture suggest the Japanese consumers do not like the meat ball. It is our interpretation that the Colonial Farm Meat Balls and Sauce product has too much fat and is too highly emulsified. A systematic study of fat content and degree of emulsification should pin point how to will increase the liking of the flavour of the product in general, meat flavour and meat texture.

DETERMINANTS OF LIKING MEAN SCORES



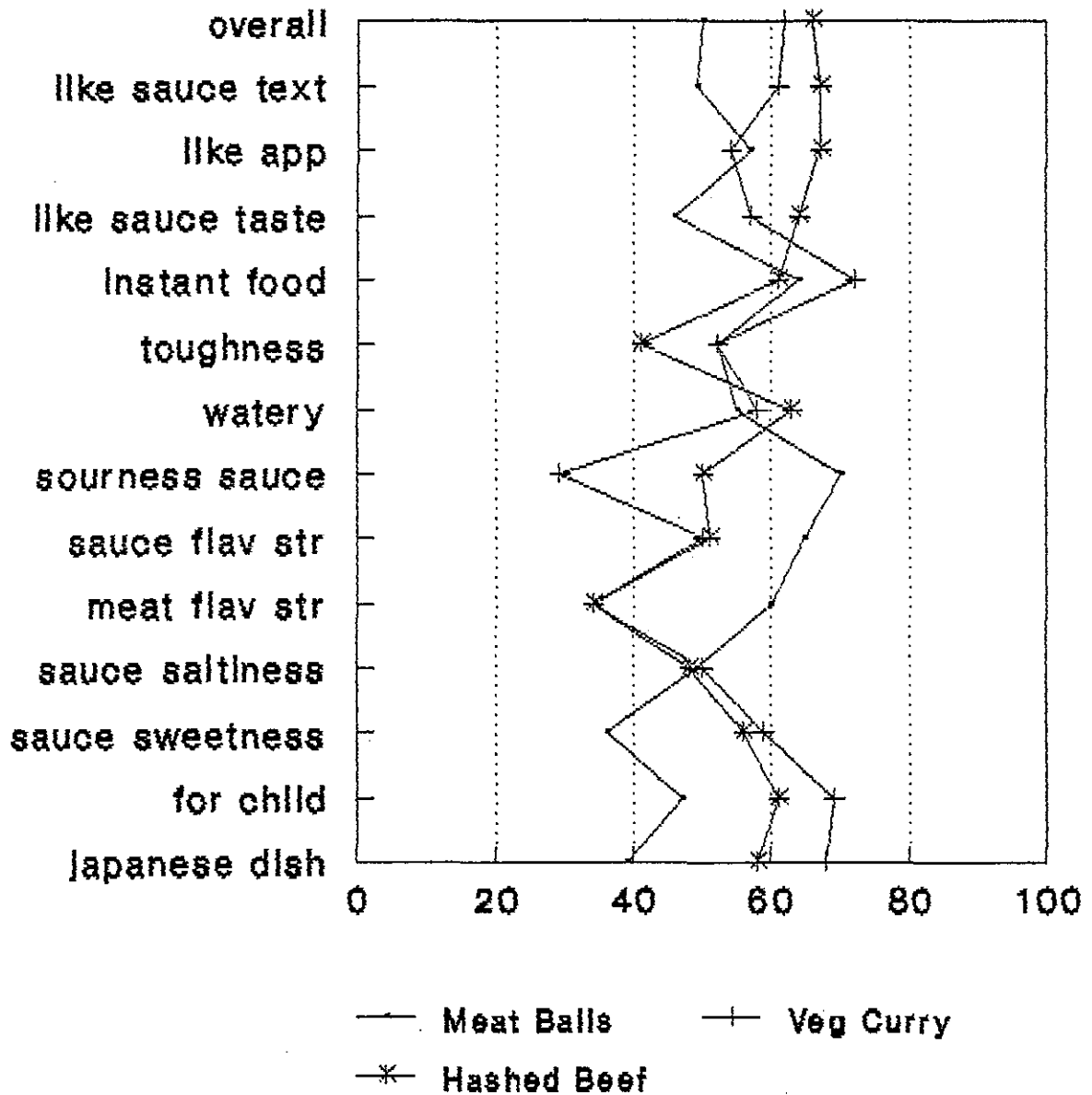
The figure following shows how the products scored on the remaining attributes.

The Hashed Beef and Vegetable Curry show similar sensory profiles except the Vegetable Curry is considered to have a significantly more sour sauce than the Hashed Beef product.

The Colonial Farm Meat Balls and Sauce product has a lower liking in sauce texture and sauce taste than the Hashed Beef and Vegetable Curry products. The sauce of the Colonial Farm Meat Balls and Sauce product is considered more sour, and less sweet than the Hashed Beef and Vegetable Curry products.

The Colonial Farm Meat Balls and Sauce product has a strong meat and sauce flavour, is not suited for children or a Japanese dish, when compared to both the Hashed Beef and Vegetable Curry products.

MEAN SCORES REMAINING ATTRIBUTES



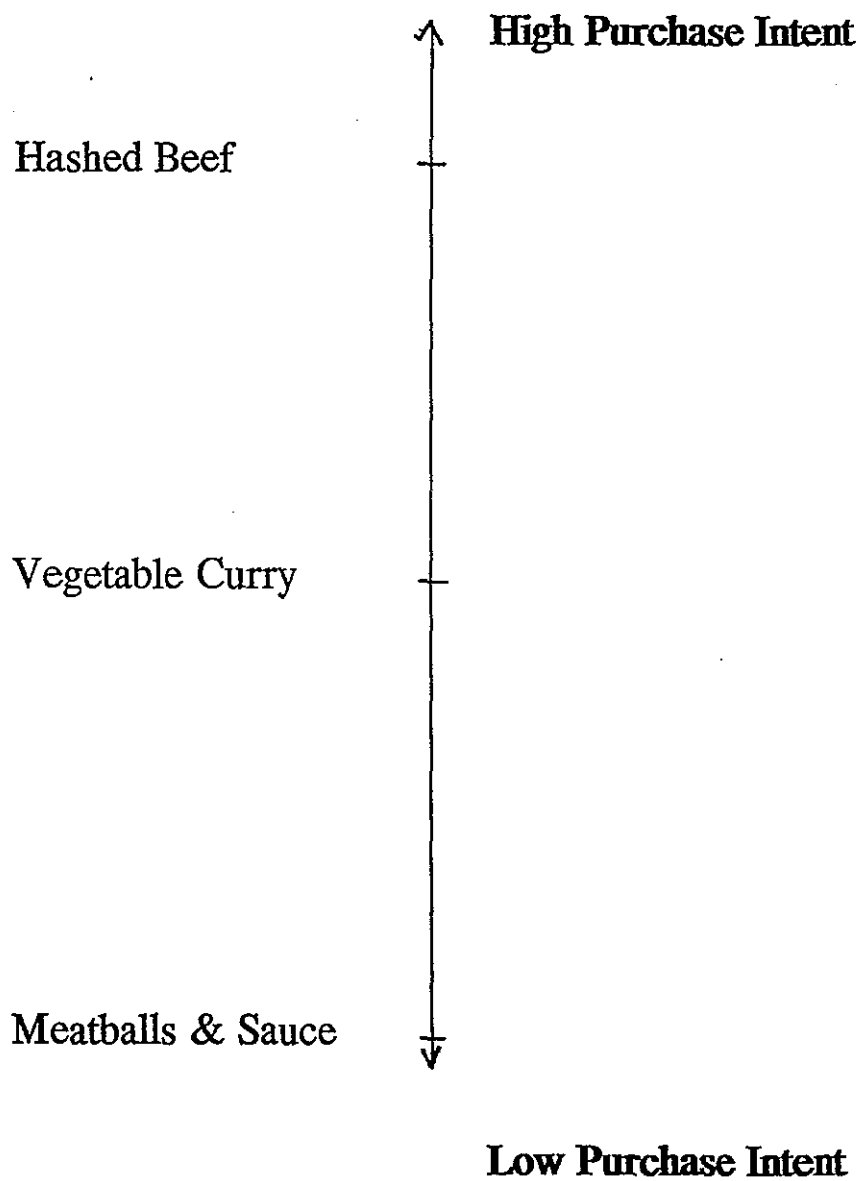
6. How likely are Japanese consumers to buy the Colonial Farm product compared to two familiar Japanese dishes?

To see how likely the Japanese are to purchase the Colonial Farm Meat Balls with Spicy Italian Sauce product rather than either the Hashed Beef and Vegetable Curry products, consumers purchase intent was assessed. This was done by placing the products in pairs and asking consumers to select the product which they are more likely to buy.

The relative purchase intent of the three products is shown in the Thurstone Scale presented on the following page. The Thurstone scale gives the relative purchase intent of each product.

This indicates given the choice of the three products, Japanese consumers are most likely to purchase the Hashed Beef product followed by the Vegetable Curry product, and the least likely product to be purchased is the Colonial Farm Meat Balls with Spicy Italian Sauce product. These results reflect the scores each product achieved on overall liking.

PURCHASE INTENT

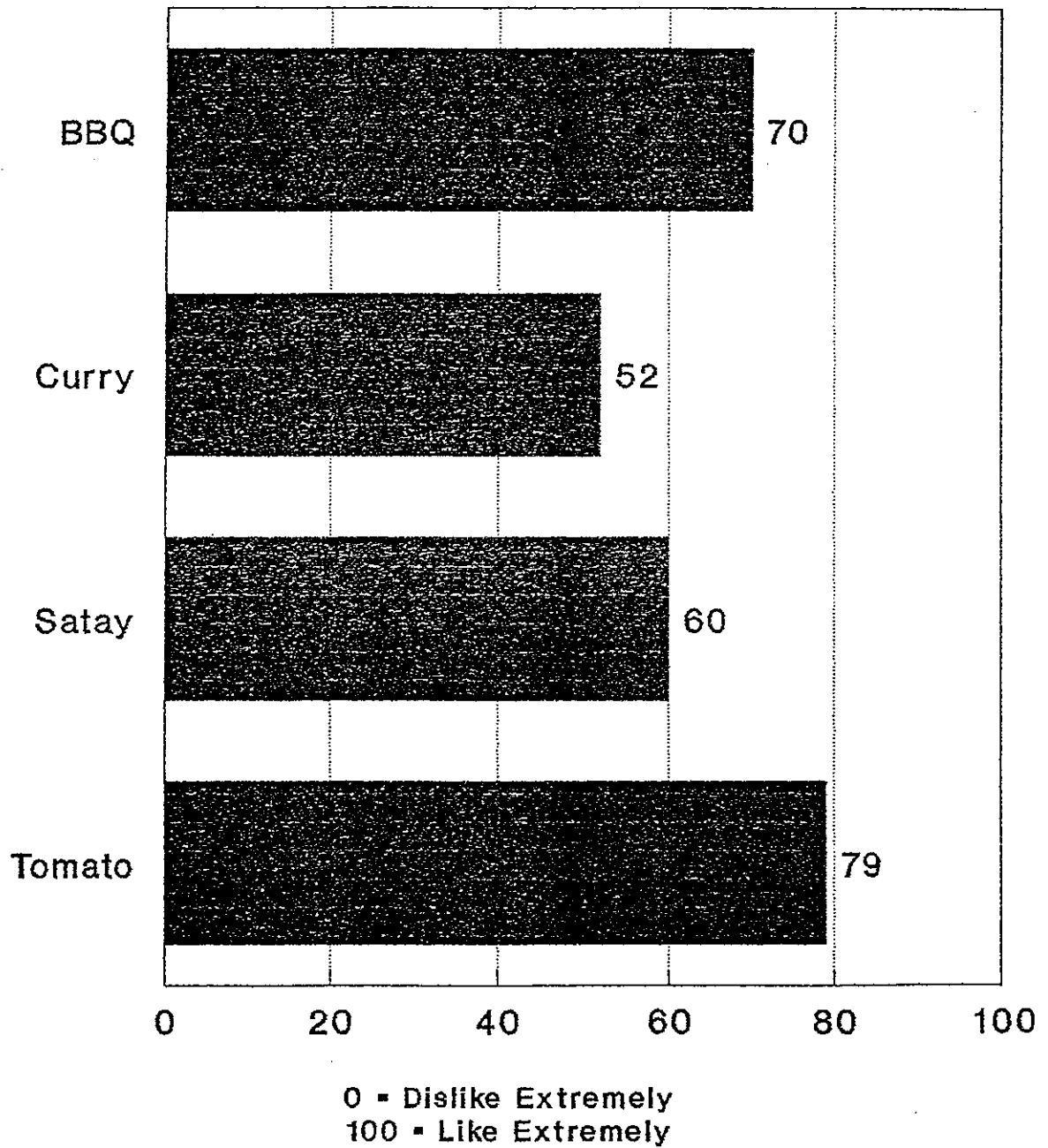


7. Is there potential for other sauce flavours to be added for the Japanese market?

Japanese consumers were asked how much they liked the idea of sauce flavours such as BBQ, Curry, Satay and Tomato for the meat balls. The figure on the following page shows consumers liking of the idea of the different sauce flavours for the meat balls.

The figure on the following page indicates there is potential for other sauce flavours to be added. The Tomato and BBQ flavoured sauces are the most appealing followed by the Satay. The idea of a Curry flavoured sauce did not score well with the Japanese and investigation of a curry flavour should not be pursued as an avenue for product development.

Liking of sauce flavours for meatballs



8. How can the product be improved if necessary?

The Colonial Farm Meat Balls with Spicy Italian Sauce product needs to be improved in both concept and flavour.

The Colonial Farm Meat Balls with Spicy Italian Sauce product concept may be improved by investigating a reduction in the package size. The liking of the picture and overall design may also need attention.

The flavour and texture of the Colonial Farm Meat Balls and Sauce product performed poorly when compared to the Hashed Beef and Vegetable Curry products. This problem is mainly due to the meat balls. The 'sausage like' highly emulsified form of the sausages needs to be modified.

A systematic study of ingredients and degree of emulsifications would optimise liking of the meat balls.

APPENDIX

**CONSUMER
QUESTIONNAIRE**

牛肉の試食会へようこそ

口の中の洗浄の仕方とアンケート用紙の実演をご覧になり
下記の質問にお答え下さい。

このアンケートは三部門から成っています。

- I) パッケージを見て感想を書いて下さい。
- II) それぞれの試食品を試食して下さい。
- III) いくつかの追加質問に答えて下さい。

少なくともサンプルの半分は食べて下さい。

質問順に食べて下さい。

年齢： 13～19才 20～29才

30～45才 46才以上

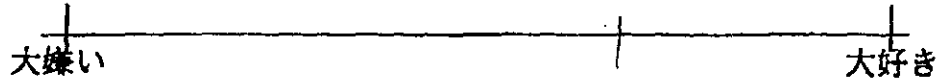
性別： 男性 女性

皆様のお好みの商品を作る食品産業のために、ご協力頂きまして
ありがとうございます。

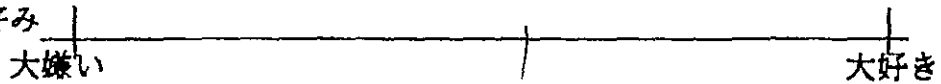
用意されたパッケージを見て下さい。

商品 092

見た感じの
ソースの味の好み



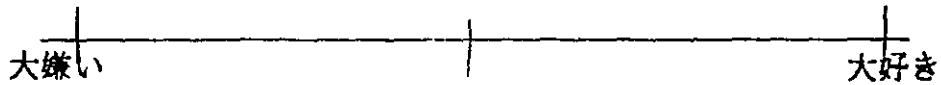
見た感じの
肉の味の好み



見た感じの
全体の味の好み



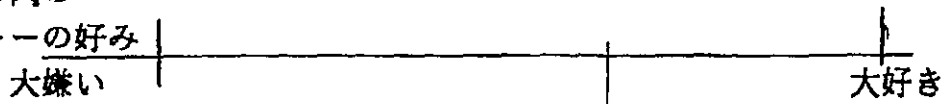
全体の外観の好み



見た感じのソースの
テクスチャーの好み



見た感じの肉の
テクスチャーの好み



見た感じの
全体の好み



見た感じの

保存期間の長さ

短い

長い

パックの大きさの

好み

大嫌い

大好き

この用意された

商品は新鮮か

新鮮じゃない

とても新鮮

商品が見えるところの

ラップの好み

大嫌い

大好き

プラスチックの

容器の好み

大嫌い

大好き

写真の好み

大嫌い

大好き

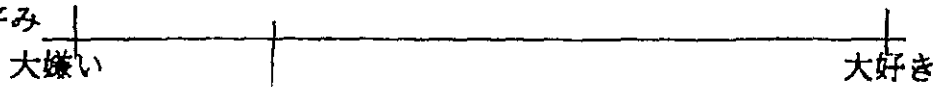
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商品 536

見た感じの
ソースの味の好み



見た感じの
肉の味の好み



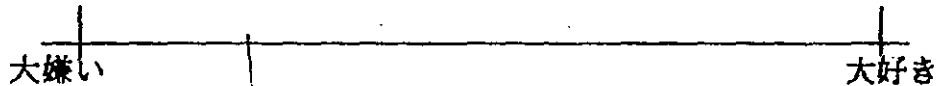
見た感じの
全体の味の好み



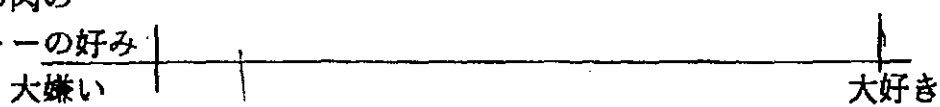
全体の外観の好み



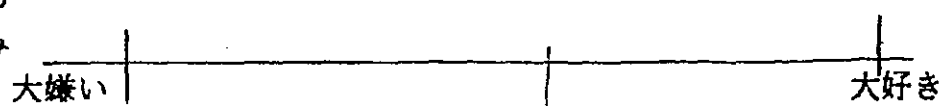
見た感じのソースの
テクスチャーの好み



見た感じの肉の
テクスチャーの好み



見た感じの
全体の好み



536

見た感じの

保存期間の長さ

短い

長い

パックの大きさの

好み

大嫌い

大好き

この用意された

商品は新鮮か

新鮮じゃない

とても新鮮

厚紙のパックの

好み

大嫌い

大好き

写真の好み

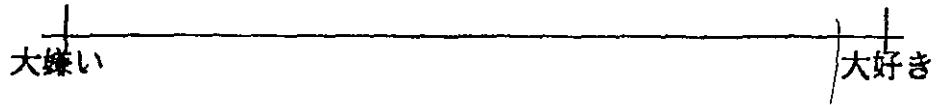
大嫌い

大好き

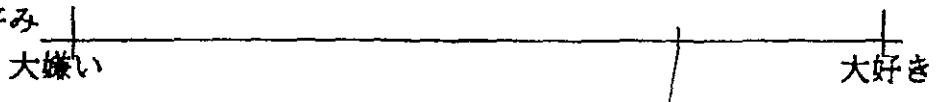
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商品 **793**

見た感じの
ソースの味の好み



見た感じの
肉の味の好み



見た感じの
全体の味の好み



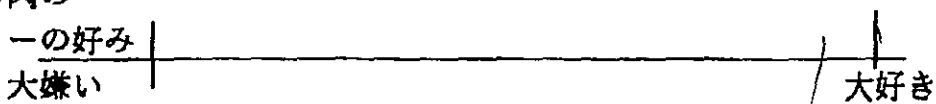
全体の外観の好み



見た感じのソースの
テクスチャーの好み



見た感じの肉の
テクスチャーの好み



見た感じの
全体の好み



793

見た感じの

保存期間の長さ

短い

長い

パックの大きさの

好み

大嫌い

大好き

この用意された

商品は新鮮か

新鮮じゃない

とても新鮮

厚紙のパックの

好み

大嫌い

大好き

写真の好み

大嫌い

大好き

この商品を試食して下さい。

商品 092

ソースの味の好み



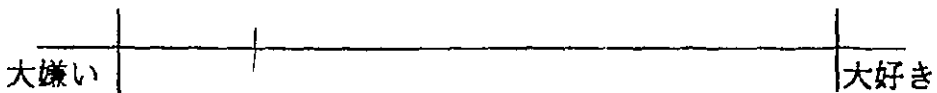
肉の味の好み



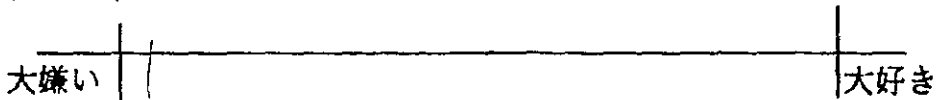
全体の味の好み



全体の外観の好み



ソースのテクスチャーの好み



肉のテクスチャーの好み



全体の好み

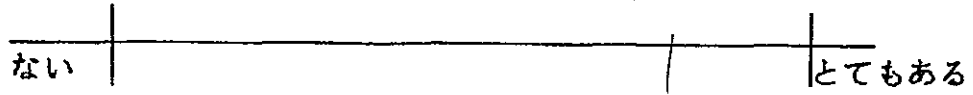


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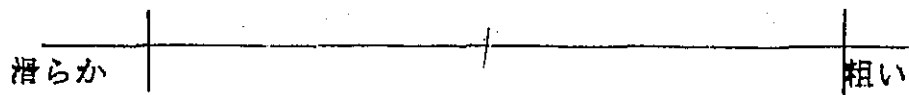
ソースの酸っぱさ



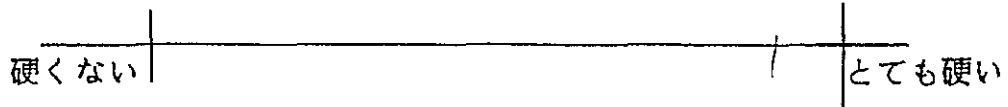
ソースの水気



肉のテクスチャー



肉の硬さ



これはインスタント
の食べ物ようだ



色の度合

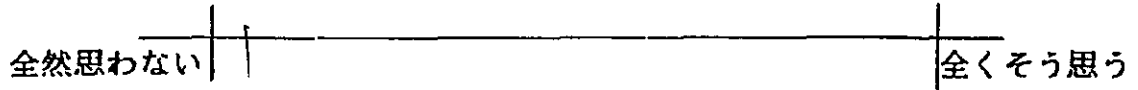


092

新鮮さ



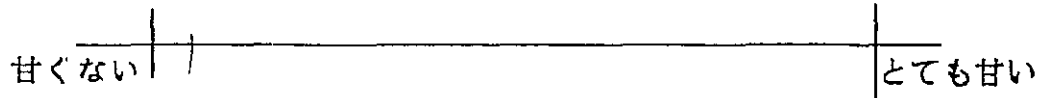
これは日本風の料理か



これは子供のための料理になるか



ソースの甘さ



ソースの塩辛さ



肉の風味の強さ



ソースの風味の強さ



この商品を試食して下さい。

商品 536

ソースの味の好み



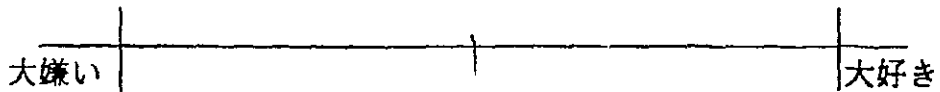
肉の味の好み



全体の味の好み



全体の外観の好み



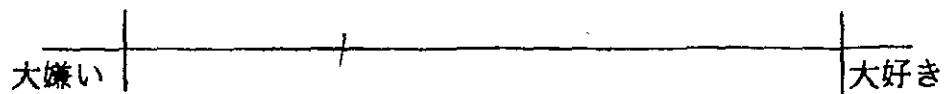
ソースのテクスチャーの好み



肉のテクスチャーの好み

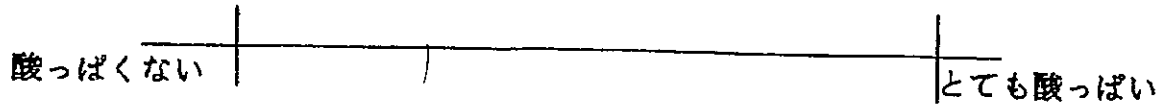


全体の好み



536

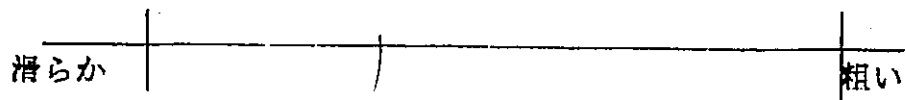
ソースの酸っぱさ



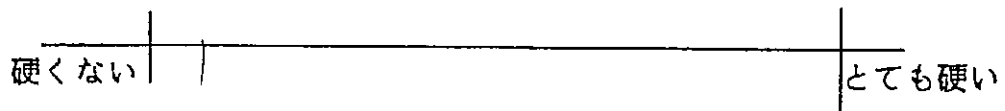
ソースの水気



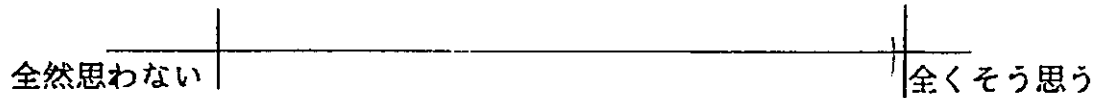
肉のテクスチャー



肉の硬さ



これはインスタント
の食べ物のような



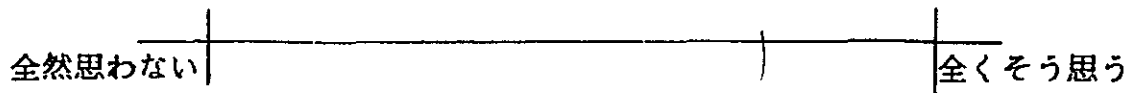
色の度合



新鮮さ



これは日本風の料理か



これは子供のための料理になるか



ソースの甘さ



ソースの塩辛さ



肉の風味の強さ



ソースの風味の強さ



この商品を試食して下さい。

商品 **793**

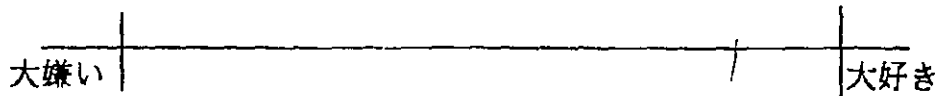
ソースの味の好み



肉の味の好み



全体の味の好み



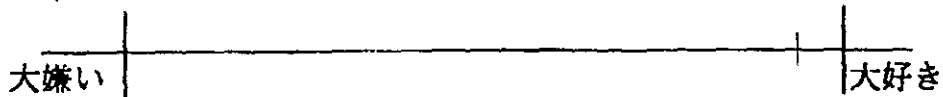
全体の外観の好み



ソースのテクスチャーの好み



肉のテクスチャーの好み



全体の好み



793

ソースの酸っぱさ



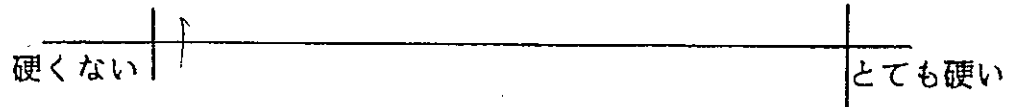
ソースの水気



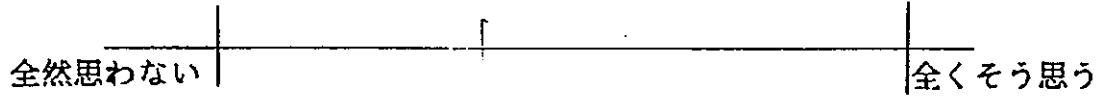
肉のテクスチャー



肉の硬さ



これはインスタント
の食べ物ようだ



色の度合

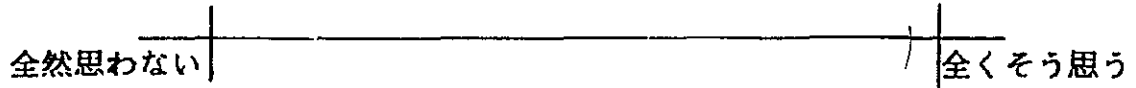


793

新鮮さ



これは日本風の料理か



これは子供のための料理になるか



ソースの甘さ



ソースの塩辛さ



肉の風味の強さ



ソースの風味の強さ



スーパーマーケットで買うことになる下記の対の商品を
見て下さい。

どちらの商品を買いますか。
買うほうに印 (V) をつけて下さい。

536 [] と 793 [✓]

092 [] と 536 [✓]

793 [✓] と 092 []

ミートボール用の下記のソースのお好みは。

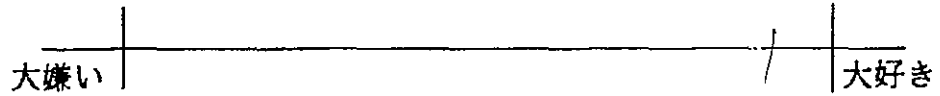
トマトソース



ソテーソース



カレーソース



バーベキューソース



Project Bear

WELCOME TO

MEAT TASTING!

Please watch the demonstration on how to use palate cleansers and how to complete the questionnaire.

There are three parts to this questionnaire.

- I) Look at the packaging and record expectations.
- II) Taste each product.
- III) Answer some additional questions.

Please eat at least half of the sample.

Please eat the products in the order presented in the questionnaire.

AGE GROUP:

13-19 years [] 20-29 years [] 30-45 years [] 46 plus []

SEX: MALE [] FEMALE []

Thank you, you have helped the food industry to produce the products that you prefer.

Please look at the packaging provided

Product _____

expected overall
liking

dislike
extremely

like
extremely

expected liking of
meat texture

dislike
extremely

like
extremely

expected
liking
of sauce texture

dislike
extremely

like
extremely

expected
overall liking
of appearance

dislike
extremely

like
extremely

expected
overall liking
of taste

dislike
extremely

like
extremely

expected
liking
of meat taste

dislike
extremely

like
extremely

expected
liking
of sauce taste

dislike
extremely

like
extremely

Liking of
picture

dislike
extremely

like
extremely

Liking of
cardboard pack

dislike
extremely

like
extremely

This is a
freshly prepared
product

disagree
strongly

agree
strongly

Liking of
pack size

dislike
extremely

like
extremely

Expected
storage life

short

long

Liking of
picture

dislike
extremely

like
extremely

Liking of
plastic tub

dislike
extremely

like
extremely

Liking of
plastic window

dislike
extremely

like
extremely

This is a
freshly prepared
product

disagree
strongly

agree
strongly

Liking of
pack size

dislike
extremely

like
extremely

Expected
storage life

short

long

Now please taste the product

Product _____

overall liking

dislike
extremely

like
extremely

liking of
meat texture

dislike
extremely

like
extremely

liking
of sauce texture

dislike
extremely

like
extremely

overall liking
of appearance

dislike
extremely

like
extremely

overall liking
of taste

dislike
extremely

like
extremely

liking
of meat taste

dislike
extremely

like
extremely

liking
of sauce taste

dislike
extremely

like
extremely

intensity of
colour

not
strong

very
strong

This is like
an instant food

disagree
strongly

agree
strongly

Toughness of
meat

not
tough

very
tough

Texture of
meat

smooth

rough

Wateriness of
sauce

not
watery

very
watery

Sourness of
sauce

not
sour

very
sour

Sauce flavour
strength

not strong _____ very strong

Meat flavour
strength

not strong _____ very strong

Saltiness of
sauce

not salty _____ very salty

Sweetness of
sauce

not sweet _____ very sweet

This is a
children's
dish

disagree strongly _____ agree strongly

This is like
a Japanese
dish

disagree strongly _____ agree strongly

Freshness

not fresh _____ very fresh

Look at these **PAIRS** of products which may be available
in a supermarket for you to buy.

In each pair, please tick which product you would buy?

536 [] or 793 []

092 [] or 536 []

793 [] or 092 []

How much do you like the idea of the following sauce flavours
for these meatballs ?

BBQ

dislike
extremely

like
extremely

Curry

dislike
extremely

like
extremely

Satay

dislike
extremely

like
extremely

Tomato

dislike
extremely

like
extremely

**S.M.A.R.T.'s
METHODOLOGY**

A NOTE ABOUT SMART'S CONSUMER SAMPLES

1) Random Sampling

We normally select our consumer sample from a large number of consumers who have a non-zero chance of being selected. A large number of screening questionnaires are distributed through organisations and extended families. Hence, respondents are selected at random from more than the required number of suitable screening responses. The people selected come from a wide range of backgrounds and have no more in common than people who shop in the same shopping centre.

It is well known by sampling frame experts that quota sampling as practised by most market research companies usually means that you stop sampling as soon as you have filled your quota; the next group of people to walk past have no chance of being selected. This produces a biased sample of consumers as each person does not have an equal chance of being selected. The additional disadvantage of quota sampling, is that the environment is not uniform for all consumers tested, and neither can the environment be controlled.

2) Familiar Location Testing

SMART conducts its test in a central familiar location which is known to the consumers eg - at their school hall. Greater external validity of data can be achieved by allowing consumers to remain in a suitable environment. The disadvantage of sensory testing in a laboratory environment as practised by sensory researchers is that the laboratory is a foreign and therefore an uncomfortable environment for most consumers.

A NOTE ON SMART'S QUESTIONNAIRES

1. The main questionnaires are usually derived from the interviews of 30 consumers using the repertory grid technique. Consumers will be presented with two food stimuli at a time.

Using a predetermined sequence, consumers will be asked how stimuli are similar or different. The vocabulary elicited will be recorded and the frequency of vocabulary will be used to determine which attributes should be evaluated in a questionnaire for the whole population.

Experienced in a number of countries and articles in the research literature have demonstrated that no useful new terms are generally elicited after 25 - 30 people have been interviewed using the repertory grid technique.

The repertory grid procedure is specifically based, and derives the actual vocabulary consumers use to describe breakfast cereals, rather than words which researchers think consumers are likely to use. The repertory grid technique is based in the personal construct theory developed and verified by the American psychologist, Kelly in the 50's, and elicits vocabulary with the aid of relevant stimuli presented to an experimental design.

2. Each questionnaire designed seeks to relate every question to an ingredient or process so that actionable results can be achieved.

3. Most questionnaires are based on 100mm line scales for a number of reasons:

a) consumers find these are easy to use and give a spontaneous response - just place a mark on a scale.

b) line scales encourage data to be normally distributed because there are an infinite number of points to be chosen from.

c) a full range of statistical analyses can be easily applied to normally distributed data. 'Tick the box' collection of data is not normally distributed until around 1000 cases have been collected. In any event it should be proven in each case that category (ie - tick the box) data is normally distributed before traditional analyses are applied.

A NOTE ABOUT SMART'S DATA ANALYSIS

The range of data analysis techniques which may be used are listed below:

Means

Crosstabulations

Test of Homogeneity of Variance

Multiple Regression

Test for Residuals and Outliers

Tests for Multicollinearity

Factor Analyses

Principal Components Analyses

Multiple Discriminant Analyses

Analyses of Variance

Multivariate Analyses of Variance

Correlations

Linear Modeling

Nonlinear Estimation

Nonparametric Analyses

ARIMA Modeling

Forecasting using Linear and Curvilinear Models

T-Tests

Tukey HSD Tests

Cluster Analysis

Multidimensional Scaling

Response Surface Methodology

Log-Linear Modeling

DATA TABULATIONS

THE FOLLOWING RESULTS ARE FOR:

PROD = 92.000

STATS 1

EXPECTED.

TOTAL OBSERVATIONS: 30

	XOVERALL	XLKTEXT	XLKSCTXT	XLKAPP	XLKTST
N OF CASES	30	30	30	30	30
MEAN	50.667	50.667	56.667	45.000	56.667
STANDARD DEV	17.750	20.288	17.827	14.856	17.237

	XLKMTST	XSCTST	LKPIC	LKCARDPK	FREPREP
N OF CASES	30	30	30	30	30
MEAN	51.667	57.667	57.333	38.333	44.000
STANDARD DEV	19.885	16.386	23.295	18.631	19.538

	LKPAKSIZ	STORAGE
N OF CASES	30	30
MEAN	52.333	35.333
STANDARD DEV	19.815	17.317

THE FOLLOWING RESULTS ARE FOR:

PROD = 536.000

TOTAL OBSERVATIONS: 30

	XOVERALL	XLKTEXT	XLKSCTXT	XLKAPP	XLKTST
N OF CASES	30	30	30	30	30
MEAN	34.000	34.667	38.667	31.667	40.667
STANDARD DEV	21.552	20.759	23.560	21.064	23.589

	XLKMTST	XSCTST	LKPIC	LKCARDPK	FREPREP
N OF CASES	30	30	30	30	30
MEAN	41.333	45.333	25.667	52.000	37.333
STANDARD DEV	21.573	24.280	19.989	24.375	20.288

	LKPAKSIZ	STORAGE
N OF CASES	30	30
MEAN	69.000	67.333
STANDARD DEV	20.611	25.554

M.193 - Sensory Analysis of the Meatball Project for the Japanese Market

THE FOLLOWING RESULTS ARE FOR:

PROD = 793.000

TOTAL OBSERVATIONS: 30

	XOVERALL	XLKTEXT	XLKSCTXT	XLKAPP	XLKTST
N OF CASES	30	30	30	30	29
MEAN	68.667	60.000	73.000	75.333	72.241
STANDARD DEV	18.659	23.007	17.499	19.737	21.027

	XLKMTST	XSCTST	LKPIC	LKCARDPK	FREPREP
N OF CASES	30	30	30	30	30
MEAN	66.333	74.667	66.333	70.667	55.667
STANDARD DEV	23.596	19.737	23.596	21.764	19.286

	LKPAKSIZ	STORAGE
N OF CASES	30	30
MEAN	73.667	74.000
STANDARD DEV	15.698	16.474

SUMMARY STATISTICS FOR XOVERALL

BARTLETT TEST FOR HOMOGENEITY OF GROUP VARIANCES

CHI-SQUARE = 1.189 DF= 2 PROBABILITY = 0.552

ANALYSIS OF VARIANCE

SOURCE	SUM OF SQUARES	DF	MEAN SQUARE	F	PROBABILITY
BETWEEN GROUPS	18035.556	2	9017.778	23.990	0.000
WITHIN GROUPS	32703.333	87	375.900		

MATRIX OF PAIRWISE ABSOLUTE MEAN DIFFERENCES

	1	2	3
1	0.000		
2	16.667	0.000	
3	18.000	34.667	0.000

M.193 - Sensory Analysis of the Meatball Project for the Japanese Market

BETA 1

THE FOLLOWING RESULTS ARE FOR:

PROD = 92.000

*STATS 2
ACTUAL*

TOTAL OBSERVATIONS: 30

	OVERALL	LKMTXT	LKSCTXT	LKAPP	LKTST
N OF CASES	30	30	30	30	30
MEAN	50.000	42.000	48.667	57.000	42.000
STANDARD DEV	18.147	23.067	20.592	24.830	18.597

	LKMTST	LKSCTST	COLOUR	INSTFOOD	TOUGH
N OF CASES	30	30	30	30	30
MEAN	39.333	46.000	50.667	64.333	51.667
STANDARD DEV	22.695	22.947	16.333	20.833	24.821

	MTXT	WATERY	SOURSC	SCFLAVST	MFLAVST
N OF CASES	30	29	30	30	30
MEAN	53.667	55.345	69.667	64.667	60.333
STANDARD DEV	18.333	11.175	16.761	20.424	25.962

	SCSALT	SCSWEET	CHILDS	JAP	FRESH
N OF CASES	30	30	30	30	30
MEAN	49.000	36.000	47.333	39.000	47.000
STANDARD DEV	19.046	13.481	21.764	22.682	18.458

THE FOLLOWING RESULTS ARE FOR:

PROD = 536.000

TOTAL OBSERVATIONS: 30

	OVERALL	LKMTXT	LKSCTXT	LKAPP	LKTST
N OF CASES	30	30	30	30	30
MEAN	62.333	50.333	61.000	54.000	60.000
STANDARD DEV	26.773	22.242	21.592	23.976	27.260

	LKMTST	LKSCTST	COLOUR	INSTFOOD	TOUGH
N OF CASES	30	30	30	30	30
MEAN	50.667	56.667	48.000	71.667	51.667
STANDARD DEV	23.589	27.175	22.461	18.631	20.567

M.193 - Sensory Analysis of the Meatball Project for the Japanese Market

	MTXT	WATERY	SOURSC	SCFLAVST	MFLAVST
N OF CASES	30	30	30	30	30
MEAN	55.000	58.333	29.333	50.333	33.667
STANDARD DEV	20.342	11.842	15.687	21.129	13.830

	SCSALT	SCSWEET	CHILDS	JAP	FRESH
N OF CASES	30	30	30	30	30
MEAN	50.000	59.333	69.000	68.000	49.333
STANDARD DEV	21.616	19.597	24.439	23.511	17.555

THE FOLLOWING RESULTS ARE FOR:
 PROD = 793.000

TOTAL OBSERVATIONS: 30

	OVERALL	LKMTXT	LKSCTXT	LKAPP	LKTST
N OF CASES	30	29	30	30	30
MEAN	65.667	52.931	67.000	67.333	65.000
STANDARD DEV	25.042	25.125	23.983	22.695	25.731

	LKMTST	LKSCTST	COLOUR	INSTFOOD	TOUGH
N OF CASES	29	30	30	30	30
MEAN	52.931	64.333	50.000	61.000	40.667
STANDARD DEV	24.404	26.514	18.147	17.538	23.295

	MTXT	WATERY	SOURSC	SCFLAVST	MFLAVST
N OF CASES	30	30	30	30	29
MEAN	47.000	63.333	49.667	51.000	34.310
STANDARD DEV	23.983	12.888	22.854	16.733	14.375

	SCSALT	SCSWEET	CHILDS	JAP	FRESH
N OF CASES	30	30	30	30	30
MEAN	48.000	56.333	60.667	58.000	53.000
STANDARD DEV	21.520	20.965	25.418	23.802	17.100